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EXAMINER	
BROCK II, PAUL E	
ART UNIT	**PAPER NUMBER**
2815	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	08/520,079	YAMAZAKI ET AL.	
	Examiner	Art Unit	
	Paul E Brock II	2815	pw

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 26 January 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 73-116,123-141 and 143-155 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 73-116,123-141 and 143-155 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 28 August 1995 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 73 – 116, 123 –141, and 143 – 155 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (USPAT 5563426, Zhang[1]).

With regard to claim 73, Zhang[1] discloses in figure 4c a thin film transistor. Zhang[1] discloses in figures 1a – 1c, 2a - 2d, and 4a – 4c a crystalline semiconductor island (3) over a substrate (1a) having an insulating surface (1b). Zhang[1] discloses in figures 4b and 4c source (25a and 25c) and drain regions (25b and 25d) in said semiconductor island. Zhang[1] discloses in figure 4b a channel forming region (between 25a and 25b in figure 4b) between said source and drain regions. Zhang[1] discloses in figures 4a – 4c a gate insulating film (22) adjacent to at least said channel forming region. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate electrode (23a) adjacent to said channel forming region having said gate insulating film therebetween, wherein said channel forming region has no grain boundary (4). No differences have been pointed out in the formation of the channel forming region of Zhang[1] and the channel forming region of the current pending claim in view of the currently pending specification. Therefore Zhang[1] must teach in figures 1a – 1c, 2a – 2d and 4a – 4c wherein said semiconductor island includes a spin density not higher than 1 x 10^{17} cm^{-3}, because an identical spin density is a property that must be shared by products that result from two processes that are the same.

Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said crystalline semiconductor island includes hydrogen at concentration less than 1×10^{20} cm^{-3} (i.e. the known atomic density of Si is 10^{22} cm^{-3}, less than 5% of 10^{22} is less than 10^{20}). It is not clear if Zhang[1] teaches that the hydrogen concentration is not greater than 1×10^{20} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the hydrogen atom concentration of not greater than 1×10^{20} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Further, any changes in particular device concentrations or properties would have been routine experimentation for one of ordinary skill seeking to maximize device function in the device of Zhang[1].

With regard to claim 74, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 wherein the crystalline semiconductor island comprise a material of Ni.

With regard to claim 75, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 a thin film transistor wherein said material is included in said semiconductor island at a concentration less than 5×10^{19} cm^{-3}. It is not clear if Zhang[1] teaches that the material is included in the semiconductor at a concentration not greater than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the material included in the semiconductor at a concentration not greater than 5×10^{19} cm^{-3}in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 76, Zhang[1] discloses in column 9, lines 38 – 45 a thin film transistor wherein said semiconductor island includes the point defect (oxygen) of less1 x 10^{18} cm^{-3}. It is

not clear if Zhang[1] teaches wherein said semiconductor island includes a point defect of 1×10^{16} cm^{-3} or more. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to have said semiconductor island include a point defect of 1×10^{16} cm^{-3} or more in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Zhang[1] teaches in column 11, lines 47 – 56 that is obvious to have the hydrogen element for neutralizing the point defect at a concentration of 1×10^{18}.

With regard to claim 77, it is obvious in Zhang[1] wherein said semiconductor island includes the spin density not lower than 1×10^{15} cm^{-3}.

With regard to claim 78, Zhang[1] discloses in column 4, lines 18 – 20 wherein said semiconductor island is a silicon island.

With regard to claim 79, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 80, Zhang[1] discloses in figure 4c a thin film transistor. Zhang[1] discloses in figures 1a – 1c, 2a - 2d, and 4a – 4c a crystalline semiconductor island on an insulating surface. Zhang[1] discloses in figures 4b and 4c source and drain regions in said

semiconductor island. Zhang[1] discloses in figure 4b a channel forming region between said source and drain regions. Zhang[1] discloses in figures 4a – 4c a gate insulating film on at least said channel forming region. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate electrode over said channel forming region having said gate insulating film therebetween, wherein said channel forming region has no grain boundary. Zhang[1] discloses in column 9, lines 38 – 45 a thin film transistor wherein said semiconductor island includes the point defect (oxygen) of less1 x 10^{18} cm^{-3}. It is not clear if Zhang[1] teaches wherein said semiconductor island includes a point defect of 1 x 10^{16} cm^{-3} or more. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to have said semiconductor island include a point defect of 1 x 10^{16} cm^{-3} or more in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said crystalline semiconductor island includes hydrogen at concentration less than 1 x 10^{20} cm^{-3} (i.e. the known atomic density of Si is 10^{22} cm^{-3}, less than 5% of 10^{22} is less than 10^{20}). It is not clear if Zhang[1] teaches that the hydrogen concentration is not higher than 1 x 10^{20} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the hydrogen atom concentration of not higher than 1 x 10^{20} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Further, any changes in particular device concentrations or properties would have been routine experimentation for one of ordinary skill seeking to maximize device function in the device of Zhang[1].

With regard to claim 81, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 wherein the crystalline semiconductor island comprise a material of Ni.

With regard to claim 82, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 a thin film transistor wherein said material is included in said semiconductor island at a concentration less than 5 x 10^{19} cm^{-3}. It is not clear if Zhang[1] teaches that the material is included in the semiconductor at a concentration not higher than 5 x 10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the material included in the semiconductor at a concentration not higher than 5 x 10^{19} cm^{-3}in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 83, Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said semiconductor island includes hydrogen for neutralizing the point defect at a concentration less than 1 x 10^{20} cm^{-3}. It is not clear if Zhang[1] teaches that the hydrogen concentration is not lower than 1 x 10^{-15} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the hydrogen atom concentration of not lower than 1 x 10^{-15} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 84, No differences have been pointed out in the formation of the channel forming region of Zhang[1] and the channel forming region of the current pending claim in view of the currently pending specification. Therefore Zhang[1] must teach in figures 1a – 1c, 2a – 2d and 4a – 4c wherein said semiconductor island includes a spin density of 1 x 10^{15} to 1 x 10^{17} cm^{-3}, because an identical spin density is a property that must be shared by products that result from two processes that are the same.

With regard to claim 85, Zhang[1] discloses in column 4, lines 18 – 20 wherein said semiconductor island is a silicon island.

With regard to claim 86, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 87, Zhang[1] discloses in figure 4c a semiconductor device. Zhang[1] discloses in figures 1a – 1c, 2a - 2d, and 4a – 4c a crystalline semiconductor island on an insulating surface. Zhang[1] discloses in figures 4b and 4c source and drain regions in said semiconductor island. Zhang[1] discloses in figure 4b a channel forming region between said source and drain regions. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate insulating film adjacent to at least said channel forming region. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate electrode adjacent to said channel forming region having said gate insulating film therebetween, wherein said crystalline semiconductor island is formed in a monodomain region which contains no grain boundary. Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said crystalline semiconductor island includes hydrogen at concentration less than 1×10^{20} cm^{-3} (i.e. the known atomic density of Si is 10^{22} cm^{-3}, less than

5% of 10^{22} is less than 10^{20}). It is not clear if Zhang[1] teaches that the hydrogen concentration is not higher than 1×10^{20} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the hydrogen atom concentration of not higher than 1×10^{20} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes a p-channel thin film transistor having a mobility in a range of 20 – 100 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes a p-channel thin film transistor having mobility in a range of 200-400 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free p-channel monodomain region with mobility in a range of 200-400 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention. Further, any changes in particular device concentrations or properties would have been routine experimentation for one of ordinary skill seeking to maximize device function in the device of Zhang[1].

With regard to claim 88, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 wherein said crystalline semiconductor island comprises a material Ni.

With regard to claim 89, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 a thin film transistor wherein said material is included in said semiconductor island at a concentration less than 5×10^{19} cm^{-3}. It is not clear if Zhang[1] teaches that the material is included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that

overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the material included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 90, Zhang[1] discloses in column 4, lines 18 – 20 wherein said semiconductor island is a silicon island.

With regard to claim 91, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 92, Zhang[1] teaches in figures 1a, 1b, 2a – 2d; and column 12, lines 1 – 30 wherein said monodomain region has a grain size of 50 μm or more. It should be noted that the crystal grains (3) grown around metal portions (2) must have a grain size of 50 – 100 μm when the metal portions are set from 25 – 50 μm apart as disclosed by Zhang[1] in column 12, lines 1 – 30.

With regard to claim 93, Zhang[1] discloses in figure 4c semiconductor device. Zhang[1] discloses in figures 1a – 1c, 2a - 2d, and 4a – 4c a crystalline semiconductor island on an

insulating surface. Zhang[1] discloses in figures 4b and 4c source and drain regions in said semiconductor island. Zhang[1] discloses in figure 4b a channel forming region between said source and drain regions. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate insulating film adjacent to at least said channel forming region. Zhang[1] discloses in figures 1a-1c, 2a – 2d, and 4a – 4c a gate electrode adjacent to said channel forming region having said gate insulating film therebetween, wherein said channel forming region is formed in a monodomain region which contains no grain boundary. Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said crystalline semiconductor island includes hydrogen at concentration less than 1 x 10^{20} cm^{-3} (i.e. the known atomic density of Si is 10^{22} cm^{-3}, less than 5% of 10^{22} is less than 10^{20}). It is not clear if Zhang[1] teaches that the hydrogen concentration is not higher than 1 x 10^{20} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the hydrogen atom concentration of not higher than 1 x 10^{20} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes a n-channel thin film transistor having a mobility in a range of 30 – 150 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes an n-channel thin film transistor having mobility in a range of 500-1000 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free n-channel monodomain region with mobility in a range of 500-1000 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention. Further, any changes in

particular device concentrations or properties would have been routine experimentation for one of ordinary skill seeking to maximize device function in the device of Zhang[1].

With regard to claim 94, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 wherein said crystalline semiconductor island comprises a material Ni.

With regard to claim 95, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 a thin film transistor wherein said material is included in said semiconductor island at a concentration less than 5×10^{19} cm^{-3}. It is not clear if Zhang[1] teaches that the material is included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the material included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 96, Zhang[1] discloses in column 4, lines 18 – 20 wherein said semiconductor island is a silicon island.

With regard to claim 97, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-}

^{3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 98, Zhang[1] teaches in figures 1a, 1b, 2a – 2d; and column 12, lines 1 – 30 wherein said monodomain region has a grain size of 50 μm or more. It should be noted that the crystal grains (3) grown around metal portions (2) must have a grain size of 50 – 100 μm when the metal portions are set from 25 – 50 μm apart as disclosed by Zhang[1] in column 12, lines 1 – 30.

With regard to claim 99, Zhang[1] discloses in figure 4c semiconductor device. Zhang[1] discloses in column 9, lines 38 – 45 a p-channel thin film transistor. Zhang[1] discloses in column 9, lines 38 – 45 an n-channel thin film transistor. Zhang[1] discloses in figures 1a – 1c, 2a - 2d, and 4a – 4c a crystalline semiconductor island on an insulating surface. Zhang[1] discloses in figures 4b and 4c source and drain regions in said semiconductor island. Zhang[1] discloses in figure 4b a channel forming region between said source and drain regions. Zhang[1] discloses in figures 1a-1c, 2a – 2d, and 4a – 4c a gate insulating film adjacent to at least said channel forming region. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate electrode adjacent to said channel forming region having said gate insulating film therebetween, wherein said crystalline semiconductor island is formed in a monodomain region which contains no grain boundary. Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said crystalline semiconductor island includes hydrogen at concentration less than 1×10^{20} cm^{-3} (i.e. the known atomic density of Si is 10^{22} cm^{-3}, less than 5% of 10^{22} is less than 10^{20}). It is not clear if Zhang[1] teaches that the hydrogen concentration is not higher than 1×10^{20} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the

art to use the hydrogen atom concentration of not higher than 1×10^{20} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Further, any changes in particular device concentrations or properties would have been routine experimentation for one of ordinary skill seeking to maximize device function in the device of Zhang[1].

With regard to claim 100, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 wherein said crystalline semiconductor island comprises a material Ni.

With regard to claim 101, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 a thin film transistor wherein said material is included in said semiconductor island at a concentration less than 5×10^{19} cm^{-3}. It is not clear if Zhang[1] teaches that the material is included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the material included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 102, Zhang[1] discloses in column 4, lines 18 – 20 wherein said semiconductor island is a silicon island.

With regard to claim 103, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3}. MPEP

2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 104, Zhang[1] teaches in figures 1a, 1b, 2a – 2d; and column 12, lines 1 – 30 wherein said monodomain region has a grain size of 50 μm or more. It should be noted that the crystal grains (3) grown around metal portions (2) must have a grain size of 50 – 100 μm when the metal portions are set from 25 – 50 μm apart as disclosed by Zhang[1] in column 12, lines 1 – 30.

With regard to claim 105, Zhang[1] discloses in figure 4c semiconductor device. Zhang[1] discloses in column 9, lines 38 – 45 a p-channel thin film transistor. Zhang[1] discloses in column 9, lines 38 – 45 an n-channel thin film transistor. Zhang[1] discloses in figures 1a – 1c, 2a - 2d, and 4a – 4c a crystalline semiconductor island on an insulating surface. Zhang[1] discloses in figures 4b and 4c source and drain regions in said semiconductor island. Zhang[1] discloses in figure 4b a channel forming region between said source and drain regions. Zhang[1] discloses in figures 1a-1c, 2a – 2d, and 4a – 4c a gate insulating film adjacent to at least said channel forming region. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate electrode adjacent to said channel forming region having said gate insulating film therebetween, wherein said channel forming region is formed in a monodomain region which contains no grain boundary.Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon at a concentration not higher than 5×10^{18} cm^{-3}. MPEP

2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon at a concentration not higher than 5×10^{18} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said crystalline semiconductor island includes hydrogen at concentration less than 1×10^{20} cm^{-3} (i.e. the known atomic density of Si is 10^{22} cm^{-3}, less than 5% of 10^{22} is less than 10^{20}). It is not clear if Zhang[1] teaches that the hydrogen concentration is not higher than 1×10^{20} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the hydrogen atom concentration of not higher than 1×10^{20} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Further, any changes in particular device concentrations or properties would have been routine experimentation for one of ordinary skill seeking to maximize device function in the device of Zhang[1].

With regard to claim 106, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 wherein said crystalline semiconductor island comprises a material Ni.

With regard to claim 107, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 a thin film transistor wherein said material is included in said semiconductor island at a concentration less than 5×10^{19} cm^{-3}. It is not clear if Zhang[1] teaches that the material is included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the material included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}in

the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 108, Zhang[1] discloses in column 4, lines 18 – 20 wherein said semiconductor island is a silicon island.

With regard to claim 109, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 110, Zhang[1] teaches in figures 1a, 1b, 2a – 2d; and column 12, lines 1 – 30 wherein said monodomain region has a grain size of 50 μm or more. It should be noted that the crystal grains (3) grown around metal portions (2) must have a grain size of 50 – 100 μm when the metal portions are set from 25 – 50 μm apart as disclosed by Zhang[1] in column 12, lines 1 – 30.

With regard to claim 111, Zhang[1] discloses in figure 4c semiconductor device. Zhang[1] discloses in figures 8a and 8b; and column 9, lines 28 - 37 an active matrix circuit portion including at least a first thin film transistor. Zhang[1] discloses in column 9, lines 38 – 45 a driving circuit portion including at least a second thin film transistor. Zhang[1] discloses in figures 1a – 1c,

2a - 2d, and 4a – 4c a crystalline semiconductor island on an insulating surface. Zhang[1] discloses in figures 4b and 4c source and drain regions in said semiconductor island. Zhang[1] discloses in figure 4b a channel forming region between said source and drain regions. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate insulating film adjacent to at least said channel forming region. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate electrode adjacent to said channel forming region having said gate insulating film therebetween, wherein said crystalline semiconductor island is formed in a monodomain region which contains no grain boundary. Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said crystalline semiconductor island includes hydrogen at concentration less than 1×10^{20} cm^{-3} (i.e. the known atomic density of Si is 10^{22} cm^{-3}, less than 5% of 10^{22} is less than 10^{20}). It is not clear if Zhang[1] teaches that the hydrogen concentration is not higher than 1×10^{20} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the hydrogen atom concentration of not higher than 1×10^{20} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Further, any changes in particular device concentrations or properties would have been routine experimentation for one of ordinary skill seeking to maximize device function in the device of Zhang[1].

With regard to claim 112, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 wherein said crystalline semiconductor island comprises a material Ni.

With regard to claim 113, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 a thin film transistor wherein said material is included in said semiconductor island at a concentration less than 5×10^{19} cm^{-3}. It is not clear if Zhang[1] teaches that the material is included

in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the material included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 114, Zhang[1] discloses in column 4, lines 18 – 20 wherein said semiconductor island is a silicon island.

With regard to claim 115, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 116, Zhang[1] teaches in figures 1a, 1b, 2a – 2d; and column 12, lines 1 – 30 wherein said monodomain region has a grain size of 50 μm or more. It should be noted that the crystal grains (3) grown around metal portions (2) must have a grain size of 50 – 100 μm when the metal portions are set from 25 – 50 μm apart as disclosed by Zhang[1] in column 12, lines 1 – 30.

With regard to claim 123, Zhang[1] discloses in figure 4c a semiconductor device. Zhang[1] discloses in figures 1a – 1c, 2a - 2d, and 4a – 4c a crystalline semiconductor island on an insulating surface. Zhang[1] discloses in figures 4b and 4c source and drain regions in said semiconductor island. Zhang[1] discloses in figure 4b a channel forming region between said source and drain regions. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate insulating film adjacent to at least said channel forming region. Zhang[1] discloses in figures 1a-1c, 2a – 2d, and 4a – 4c a gate electrode adjacent to said channel forming region having said gate insulating film therebetween, wherein said crystalline semiconductor island is formed in a monodomain region which contains no grain boundary. Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. No differences have been pointed out in the formation of the channel forming region of Zhang[1] and the channel forming region of the current pending claim in view of the currently pending specification. Therefore Zhang[1] must teach in figures 1a – 1c, 2a – 2d and 4a – 4c wherein said semiconductor device has a S value of 0.03-0.3, because an identical S value is a property that must be shared by products that result from two processes that are the same. Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said crystalline semiconductor island includes hydrogen at concentration less than 1×10^{20} cm^{-3} (i.e. the known atomic density of Si is 10^{22} cm^{-3},

less than 5% of 10^{22} is less than 10^{20}). It is not clear if Zhang[1] teaches that the hydrogen concentration is not higher than 1×10^{20} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the hydrogen atom concentration of not higher than 1×10^{20} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes at least one selected from the group consisting of a p-channel thin film transistor and an n-channel thin film transistor. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes a p-channel thin film transistor having a mobility in a range of 20 – 100 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes a p-channel thin film transistor having mobility in a range of 200-400 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free p-channel monodomain region with mobility in a range of 200-400 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes an n-channel thin film transistor having a mobility in a range of 30 – 150 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes an n-channel thin film transistor having mobility in a range of 500-1000 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free n-channel monodomain region with mobility in a range of 500-1000 cm^2/Vs in the device of

Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention. Further, any changes in particular device concentrations or properties would have been routine experimentation for one of ordinary skill seeking to maximize device function in the device of Zhang[1].

With regard to claim 124, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 wherein said crystalline semiconductor island comprises a material Ni.

With regard to claim 125, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 a thin film transistor wherein said material is included in said semiconductor island at a concentration less than 5×10^{19} cm^{-3}. It is not clear if Zhang[1] teaches that the material is included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the material included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 126, Zhang[1] discloses in column 4, lines 18 – 20 wherein said semiconductor island is a silicon island.

With regard to claim 127, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not lower than 1×10^{16} cm^{-3}, and oxygen at a concentration not lower than 1×10^{17} cm^{-3}. MPEP

2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not lower than 1 x 10^{16} cm^{-3}, and oxygen at a concentration not lower than 1 x 10^{17} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 128, Zhang[1] teaches in figures 1a, 1b, 2a – 2d; and column 12, lines 1 – 30 wherein said monodomain region has a grain size of 50 μm or more. It should be noted that the crystal grains (3) grown around metal portions (2) must have a grain size of 50 – 100 μm when the metal portions are set from 25 – 50 μm apart as disclosed by Zhang[1] in column 12, lines 1 – 30.

With regard to claim 129, Zhang[1] discloses in figure 4c semiconductor device. Zhang[1] discloses in figures 1a – 1c, 2a - 2d, and 4a – 4c a crystalline semiconductor island on an insulating surface. Zhang[1] discloses in figures 4b and 4c source and drain regions in said semiconductor island. Zhang[1] discloses in figure 4b a channel forming region between said source and drain regions. Zhang[1] discloses in figures 1a- 1c, 2a – 2d, and 4a – 4c a gate insulating film adjacent to at least said channel forming region. Zhang[1] discloses in figures 1a-1c, 2a – 2d, and 4a – 4c a gate electrode adjacent to said channel forming region having said gate insulating film therebetween, wherein said crystalline semiconductor island includes carbon and nitrogen at a concentration not higher than 5 x 1018 cm-3, wherein said channel forming region is formed in a monodomain region which contains no grain boundary. No differences have been pointed out in the formation of the channel forming region of Zhang[1] and the channel forming region of the current pending claim in view of the currently pending specification. Therefore Zhang[1] must teach in figures 1a – 1c, 2a – 2d and 4a – 4c wherein said semiconductor device has

a S value of 0.03-0.3, because an identical S value is a property that must be shared by products that result from two processes that are the same. Zhang[1] discloses in figures 4c and column11, lines 47 – 56 wherein said crystalline semiconductor island includes hydrogen at concentration less than 1 x 10^{20} cm^{-3} (i.e. the known atomic density of Si is 10^{22} cm^{-3}, less than 5% of 10^{22} is less than 10^{20}). It is not clear if Zhang[1] teaches that the hydrogen concentration is not higher than 1 x 10^{20} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the hydrogen atom concentration of not higher than 1 x 10^{20} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes at least one selected from the group consisting of a p-channel thin film transistor and an n-channel thin film transistor. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes a p-channel thin film transistor having a mobility in a range of 20 – 100 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes a p-channel thin film transistor having mobility in a range of 200-400 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free p-channel monodomain region with mobility in a range of 200-400 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes an n-channel thin film transistor having a mobility in a range of 30 – 150 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes an n-channel thin film transistor having mobility

in a range of 500-1000 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free n-channel monodomain region with mobility in a range of 500-1000 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention. Further, any changes in particular device concentrations or properties would have been routine experimentation for one of ordinary skill seeking to maximize device function in the device of Zhang[1].

With regard to claim 130, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 wherein said crystalline semiconductor island comprises a material Ni.

With regard to claim 131, Zhang[1] discloses in figures 1a, 1b, and 2a; and column 6, lines 19 – 40 a thin film transistor wherein said material is included in said semiconductor island at a concentration less than 5×10^{19} cm^{-3}. It is not clear if Zhang[1] teaches that the material is included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use the material included in the semiconductor at a concentration not higher than 5×10^{19} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 132, Zhang[1] discloses in column 4, lines 18 – 20 wherein said semiconductor island is a silicon island.

With regard to claim 133, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1 x

10^{18} cm^{-3}, and oxygen at a concentration less than 1 x 10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not lower than 1 x 10^{16} cm^{-3}, and oxygen at a concentration not lower than 1 x 10^{17} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not lower than 1 x 10^{16} cm^{-3}, and oxygen at a concentration not lower than 1 x 10^{17} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 134, Zhang[1] teaches in figures 1a, 1b, 2a – 2d; and column 12, lines 1 – 30 wherein said monodomain region has a grain size of 50 μm or more. It should be noted that the crystal grains (3) grown around metal portions (2) must have a grain size of 50 – 100 μm when the metal portions are set from 25 – 50 μm apart as disclosed by Zhang[1] in column 12, lines 1 – 30.

With regard to claim 135, Zhang[1] discloses in column 9, lines 38 – 45 wherein each of the concentrations of carbon, nitrogen and oxygen is measured. A method of measuring does not define a patentable feature in a device claim. Therefore, measuring the concentration of carbon, nitrogen and oxygen by the well known technique of secondary ion mass spectroscopy (SIMS) does not bear any patentable weight in this device claim. Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the technique of SIMS to measure the concentration of carbon, nitrogen and oxygen in the device of Zhang[1] in order to understand the electrical characteristics of the device as it relates to these features. This understanding would result in better device control.

With regard to claim 136, Zhang[1] discloses in column 9, lines 38 – 45 wherein each of the concentrations of carbon, nitrogen and oxygen is measured. A method of measuring does not define a patentable feature in a device claim. Therefore, measuring the concentration of carbon, nitrogen and oxygen by the well known technique of secondary ion mass spectroscopy (SIMS) does not bear any patentable weight in this device claim. Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the technique of SIMS to measure the concentration of carbon, nitrogen and oxygen in the device of Zhang[1] in order to understand the electrical characteristics of the device as it relates to these features. This understanding would result in better device control.

With regard to claim 137, Zhang[1] discloses in column 9, lines 38 – 45 wherein each of the concentrations of carbon, nitrogen and oxygen is measured. A method of measuring does not define a patentable feature in a device claim. Therefore, measuring the concentration of carbon, nitrogen and oxygen by the well known technique of secondary ion mass spectroscopy (SIMS) does not bear any patentable weight in this device claim. Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the technique of SIMS to measure the concentration of carbon, nitrogen and oxygen in the device of Zhang[1] in order to understand the electrical characteristics of the device as it relates to these features. This understanding would result in better device control.

With regard to claim 138, Zhang[1] discloses in column 9, lines 38 – 45 wherein each of the concentrations of carbon, nitrogen and oxygen is measured. A method of measuring does not define a patentable feature in a device claim. Therefore, measuring the concentration of carbon, nitrogen and oxygen by the well known technique of secondary ion mass spectroscopy (SIMS)

does not bear any patentable weight in this device claim. Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the technique of SIMS to measure the concentration of carbon, nitrogen and oxygen in the device of Zhang[1] in order to understand the electrical characteristics of the device as it relates to these features. This understanding would result in better device control.

With regard to claim 139, Zhang[1] discloses in column 9, lines 38 – 45 wherein each of the concentrations of carbon, nitrogen and oxygen is measured. A method of measuring does not define a patentable feature in a device claim. Therefore, measuring the concentration of carbon, nitrogen and oxygen by the well known technique of secondary ion mass spectroscopy (SIMS) does not bear any patentable weight in this device claim. Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the technique of SIMS to measure the concentration of carbon, nitrogen and oxygen in the device of Zhang[1] in order to understand the electrical characteristics of the device as it relates to these features. This understanding would result in better device control.

With regard to claim 140, Zhang[1] discloses in column 9, lines 38 – 45 wherein each of the concentrations of carbon, nitrogen and oxygen is measured. A method of measuring does not define a patentable feature in a device claim. Therefore, measuring the concentration of carbon, nitrogen and oxygen by the well known technique of secondary ion mass spectroscopy (SIMS) does not bear any patentable weight in this device claim. Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the technique of SIMS to measure the concentration of carbon, nitrogen and oxygen in the device of Zhang[1] in order to

understand the electrical characteristics of the device as it relates to these features. This understanding would result in better device control.

With regard to claim 141, Zhang[1] discloses in column 9, lines 38 – 45 wherein each of the concentrations of carbon, nitrogen and oxygen is measured. A method of measuring does not define a patentable feature in a device claim. Therefore, measuring the concentration of carbon, nitrogen and oxygen by the well known technique of secondary ion mass spectroscopy (SIMS) does not bear any patentable weight in this device claim. Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the technique of SIMS to measure the concentration of carbon, nitrogen and oxygen in the device of Zhang[1] in order to understand the electrical characteristics of the device as it relates to these features. This understanding would result in better device control.

With regard to claim 143, Zhang[1] discloses in column 9, lines 38 – 45 wherein each of the concentrations of carbon, nitrogen and oxygen is measured. A method of measuring does not define a patentable feature in a device claim. Therefore, measuring the concentration of carbon, nitrogen and oxygen by the well known technique of secondary ion mass spectroscopy (SIMS) does not bear any patentable weight in this device claim. Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the technique of SIMS to measure the concentration of carbon, nitrogen and oxygen in the device of Zhang[1] in order to understand the electrical characteristics of the device as it relates to these features. This understanding would result in better device control.

With regard to claim 144, Zhang[1] discloses in column 9, lines 38 – 45 wherein each of the concentrations of carbon, nitrogen and oxygen is measured. A method of measuring does not

define a patentable feature in a device claim. Therefore, measuring the concentration of carbon, nitrogen and oxygen by the well known technique of secondary ion mass spectroscopy (SIMS) does not bear any patentable weight in this device claim. Further, it would have been obvious to one of ordinary skill in the art at the time of the present invention to use the technique of SIMS to measure the concentration of carbon, nitrogen and oxygen in the device of Zhang[1] in order to understand the electrical characteristics of the device as it relates to these features. This understanding would result in better device control.

With regard to claim 145, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than $1 \times 10^{18}\ cm^{-3}$, and oxygen at a concentration less than $1 \times 10^{18}\ cm^{-3}$. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not higher than $5 \times 10^{18}\ cm^{-3}$, and oxygen at a concentration not higher than $5 \times 10^{19}\ cm^{-3}$. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not higher than $5 \times 10^{18}\ cm^{-3}$, and oxygen at a concentration not higher than $5 \times 10^{19}\ cm^{-3}$ in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 146, Zhang[1] discloses in column 9, lines 38 – 45 wherein the thin film transistor is an n-channel thin film transistor having a mobility in a range of 30 – 150 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes an n-channel thin film transistor having mobility in a range of 500-1000 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free n-channel

monodomain region with mobility in a range of 500-1000 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention.

With regard to claim 147, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3}, and oxygen at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3}, and oxygen at a concentration not higher than 5×10^{19} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 148, Zhang[1] discloses in column 9, lines 38 – 45 wherein the thin film transistor is one of a p-channel thin film transistor having a mobility in a range of 20 – 100 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes a p-channel thin film transistor having mobility in a range of 200-400 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free p-channel monodomain region with mobility in a range of 200-400 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention.

With regard to claim 149, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3}, and oxygen at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3}, and oxygen at a concentration not higher than 5×10^{19} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 150, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3}, and oxygen at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3}, and oxygen at a concentration not higher than 5×10^{19} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 151, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1×10^{18} cm^{-3}, and oxygen at a concentration less than 1×10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not

higher than 5×10^{18} cm^{-3}, and oxygen at a concentration not higher than 5×10^{19} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3}, and oxygen at a concentration not higher than 5×10^{19} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 152, Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes a p-channel thin film transistor having a mobility in a range of 20 – 100 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes a p-channel thin film transistor having mobility in a range of 200-400 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free p-channel monodomain region with mobility in a range of 200-400 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes a n-channel thin film transistor having a mobility in a range of 30 – 150 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes an n-channel thin film transistor having mobility in a range of 500-1000 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free n-channel monodomain region with mobility in a range of 500-1000 cm^2/Vs in the device of Zhang[1]. This is because the prior art

teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention.

With regard to claim 153, Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes a p-channel thin film transistor having a mobility in a range of 20 – 100 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes a p-channel thin film transistor having mobility in a range of 200-400 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free p-channel monodomain region with mobility in a range of 200-400 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention. Zhang[1] discloses in column 9, lines 38 – 45 wherein the semiconductor device includes a n-channel thin film transistor having a mobility in a range of 30 – 150 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes an n-channel thin film transistor having mobility in a range of 500-1000 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free n-channel monodomain region with mobility in a range of 500-1000 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention.

With regard to claim 154, Zhang[1] discloses in column 9, lines 38 – 43 wherein the crystalline semiconductor island includes carbon and nitrogen at a concentration less than 1 x

10^{18} cm^{-3}. It is not clear if Zhang[1] teaches that said crystalline semiconductor island includes carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3}. MPEP 2144.05 states that overlapping ranges are obvious. It would have been obvious to one of ordinary skill in the art to use carbon and nitrogen at a concentration not higher than 5×10^{18} cm^{-3} in the device of Zhang[1] because the current claimed range and the disclosed range in Zhang[1] overlap.

With regard to claim 155, Zhang[1] discloses in column 9, lines 38 – 45 wherein the second thin film transistor is one of a p-channel thin film transistor having a mobility in a range of 20 – 100 cm^2/Vs. Zhang[1] is silent to the fact that the semiconductor device includes a p-channel thin film transistor having mobility in a range of 200-400 cm^2/Vs. Mobility is a function of the purity of the single crystal (monodomain) semiconductor. MPEP section 2144.04, VII teaches that it is obvious to one of ordinary skill in the art to have a more purely defect free p-channel monodomain region with mobility in a range of 200-400 cm^2/Vs in the device of Zhang[1]. This is because the prior art teaches a suitable method for obtaining the claimed mobility, and that fact that the monodomain region of Zhang[1] has the same utility as that of the claimed invention.

Response to Arguments

3. Applicant's arguments filed January 26, 2004 have been fully considered but they are not persuasive.

4. With regard to applicant's argument that "None of the cited references specifically teach, disclose or suggest how to arrange or form a channel region in a portion of the film with no grain

boundaries," it should be noted that Zhang[1] does in fact teach forming a channel region in a portion of a film with no grain boundaries. Zhang[1] teaches in figures 1a, 1b, and 2a – 2d forming a channel region in a portion of a film with no grain boundaries (4). Therefore, applicant's arguments are not persuasive, and the rejection is proper.

5. With regard to applicant's argument that "although Zhang '426 discloses a thin film transistors arranged so that semiconductor regions 6 do not cross boundaries 4 as shown in Fig. 1(C), Zhang '426 does not suggest or disclose the feature of the claimed invention wherein a channel forming region has no grain boundary as recited in Applicants' pending claims," it should be noted that the channel forming region is considered to be that region of the semiconductor layer lying directly underneath and between the outer boundaries of the gate layer. Another way of describing the channel-forming region would be the region between the source and drain regions. As shown in figures 1c and 2d of Zhang, only single crystal regions (6 and 3, respectively) are used to form a semiconductor active region. Because these regions were formed into single crystal, by definition, there are no grain boundaries within these regions. Further, in figures 3c, the channel region defining the claimed channel-forming region, can be seen under the gate 13a and between the source/drain regions (14a/14b). Thus, this channel-forming region in Zhang must be single crystal without any grain boundaries. The grain boundaries were eliminated in Zhang when defining active regions (3 and 6) in figures 2d and 1c, respectively. Therefore, applicant's arguments are not persuasive, and the rejection is proper.

6. With regard to applicants argument that "Zhang '426 include grain boundaries since crystals grow in the direction from island nickel regions 2. This direction of crystal growth is illustrated in Applicants' hand-drawn directional arrows in Fig. 1(B) of Zhang '426 in Attachment A submitted herewith. Therefore, Zhang '426 does not disclose or suggest the feature wherein a channel forming region has no grain boundary of the presently claimed invention." This reasoning is not understood. The indicated direction of crystal growth in figure 1b of applicant's attachment represents the growth of a single crystal region. A single crystal region has no grain boundaries. Therefore, applicant's arguments are not persuasive, and the rejection is proper.

7. With regard to applicant's arguments that "Zhang '426 does not disclose a concentration of halogen element, a point defect of 1×10^{16} cm^{-3}, and a grain size of a monodomain region. Zhang '426 merely discloses an oxygen concentration in a semiconductor film and a size of island nickel," it should be noted that applicant has not narrowed the claims to state only that a halogen element may neutralize a point defect, applicant has submitted no evidence suggesting that oxygen is not a point defect, and applicant has not discussed the rejection of the monodomain region fails. Therefore, applicant's arguments are not persuasive, and the rejection is proper.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul E Brock II whose telephone number is (571) 272-2723. The examiner can normally be reached on 8:30 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1164. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Paul E Brock II
March 16, 2004